DOCUMENT RESUME

ED 303 333 SE 050 287

AUTHOR Guenther, John E.; LaShier, William
TITLE Using the Newspaper in Secondary Science.
INSTITUTION American Newspaper Publishers Association Foundation, Washington, D.C.
PUB DATE 85
NOTE 28p.
AVAILABLE FROM American Newspaper Publishers Association Foundation, The Newspaper Center, Box 17407 Dulles Airport, Washington, DC 20024 ($20.00 prepaid).
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Career Education; *Experiential Learning; *Instructional Improvement; Interdisciplinary Approach; Minority Groups; *Newspapers; Science Activities; Science Instruction; Secondary Education; *Secondary School Science

ABSTRACT

Secondary science programs that provide students with a solid background in the principles of scientific exploration generally require active participation in gathering data and solving problems. One of the keys to success is firsthand experience with the materials studied; the use of a variety of educational materials will help students apply their findings to everyday life. This publication provides a series of classroom activities that use newspapers as a learning resource. The following topics are discussed: (1) "Secondary Science Education"; (2) "The Newspaper and Secondary Science Education"; and (3) "About the Activities" (including goals of personal needs, societal needs, academic preparation, and career education/awareness). (RT)

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Using the Newspaper in
Secondary Science

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Preface

Secondary science programs take many forms, but those that provide students with solid grounding in the principles of scientific exploration generally require youngsters to be actively involved in gathering data and solving problems. Clearly, firsthand experience with the materials they are studying is one of the keys to students' success. Moreover, high quality science programs make use of a variety of educational materials to help students apply their findings to everyday life.

The purpose of this publication is to provide secondary science teachers with a series of classroom activities that use newspapers as a learning resource. The publication lists the advantages of and educational justifications for adding newspapers to the many tools of instruction in high school science classes. *Using the Newspaper in Secondary Science* does not suggest that newspapers alone will make a science program outstanding. Rather, this document proposes that newspapers—because they are comprehensive, up-to-date and interesting to students—can be used as effective supplements to science instruction at the high school level.

Contents

Secondary science education **3**

The newspaper and secondary science education **5**

About the activities **6**

Personal needs **7**

Societal issues **12**

Academic preparation **18**

Career education/awareness **25**

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Designer/Illustrator

Secondary science education

In April 1983, a report by the National Commission on Excellence in Education noted that "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people."* The recommendations in the report focused primarily on issues associated with secondary education, and called for: (a) strengthening high school graduation requirements to include, among other changes, three years of mathematics, three years of science, and one-half year of computer science; (b) increasing expectations for student achievement; (c) lengthening both the school day and the school year; (d) improving teaching conditions and; (e) providing financial support for renewing the educational system.

The present situation parallels somewhat the time 28 years ago when our nation and its educational communities were challenged by the launching of the Soviet Union's Sputnik. Since that time, advances in science, medicine and engineering have occurred so rapidly that knowledge is often out of date before it can be incorporated into the programs of instruction in our schools. Moreover, acknowledged shortages of qualified secondary school mathematics and science teachers and a significant decline in student achievement have added to the seriousness of what currently is called a "crisis" in education.

In the post Sputnik era, our nation responded with a massive attempt at reorganizing and updating course content as well as improving the subject-matter competence of science and mathematics teachers. The present crisis presents new challenges and the need to rethink once again our educational goals and priorities.

*National Commission on Excellence in Education. A Nation At Risk: The Imperative for Educational Reform. Washington, D.C.: U.S. Government Printing Office, April 1983.

Project Synthesis

Project Synthesis, funded by the National Science Foundation, provides a detailed analysis of science education as it exists at the precollege level.* In addition, the project provides basic recommendations regarding future activities in science education. The project's report synthesizes diverse findings from four previous studies and, in its entirety, provides a clear blueprint for a new direction in science education.

Four broad goals for science education are provided in the report:

1. **Personal needs.** Science education should prepare individuals to use science for improving their own lives and for coping with an increasingly technological world.

2. **Societal issues.** Science education should produce informed citizens who are prepared to deal responsibly with science-related societal issues.

3. **Academic preparation.** Science education should allow students who are likely to pursue science academically as well as professionally to acquire the academic knowledge appropriate for their needs.

4. **Career education/awareness.** Science education should give all students an awareness of the nature and scope of a wide variety of science and technology-related careers.

*Harms, N.S. and R. E. Yager, *What Research Says to the Science Teacher*, Vol. 3, Washington, D.C.: National Science Teachers Association, 1981.

Student objectives in science

Student objectives listed in this section provide examples of the content and process areas of science that teachers can emphasize by using newspapers in their classes. The examples are adapted from Project Synthesis, as reported in the National Science Teachers Association's *What Research Says to the Science Teacher*. (See footnote for a full citation for the NSTA publication.)

The examples presented here are representative of the many student objectives listed as important by the science teachers. They are by no means the only objectives to be pursued in secondary science courses. Listed here are those that help clarify the relationship that exists between student objectives in science and the use of the newspaper as a teaching resource.

Personal needs objectives

Students should be able to:

Describe the impact that technological advance has had on the family unit, and predict the future impact of technology on such areas as transportation, careers, health services, etc.

Employ skills and knowledge to improve environmental quality.

Be able to exhibit effective consumer behavior. This requires the ability to evaluate product quality, advertising accuracy and personal need for a product.

Recognize quantifiable aspects of personal matters and apply them effectively (e.g., keeping

track of calories while on a reducing diet).

Recognize that disease, drugs and life style can disturb the normal balance of the body's systems, with the result that optimal health levels are depreciated.

Appreciate that changing biological and cultural factors influence our life patterns today and will continue to do so.

Recognize that they influence their environment and are influenced by it.

Describe examples of various "spinoffs" of the space and national defense programs (e.g., heart pacemakers, crystal growth, "space age" materials, transistors).

Use information and values to make rational decisions and evaluate the personal consequences.

Use evidence from a variety of sources to make decisions about personal health problems.

Societal issues objectives

Students should be able to:

Use information and values to make decisions and evaluate the consequences for others in their community.

Make intelligent decisions about energy issues based on knowledge of the chemistry of fossil fuels, combustion and new materials for solar energy conversion; and comprehend physical principles underlying problems of energy storage.

Recognize that human activity can seriously disrupt the pattern of change on the earth.

Recognize that human population growth can seriously influence quality of life in various ways (economic, social, food, energy, etc.)

Describe possible effects of emerging technologies to control life and death.

Give examples of how technology has increased and also decreased the rate of consumption of our natural resources.

Give examples of long-range problems associated with storage and disposal of military and space projects (e.g., nuclear weapons, satellite re-entry, nuclear waste).

Decide what are the main issues of a simple science-related social problem.

Recognize the conditions and effects of chemicals (alcohol, tranquilizers, etc.) used to modify human behavior; consider the need for social controls on the use of these chemicals.

Recognize and support research for the improvement of food products and nutrition.

Academic preparation objectives

Students should be able to:

Develop an understanding of information and concepts from a wide variety of topics selected from the life, earth and physical sciences.

Comprehend, apply, evaluate, analyze and synthesize knowledge of potential and kinetic energy, wave phenomena, sound, light, electromagnetic spectrum, static and current electricity/electronics, magnetism and electromagnetism and solar radiation.

Recognize classes of foods (fats, proteins, carbohydrates) and their biological functions in maintaining growth, energy and health requirements.

Recognize advantages of a classification system in describing and identifying diverse organisms.

Recognize that scientists deal with hypotheses, theories and models in terms of their usefulness (in explaining, predicting and encouraging growth in science) and not in terms of their absolute truth.

Grasp the meaning of simple scientific statements and understand evidence for and against the statements.

Recognize that although species differ in their adaptive capacity, all are subject to environmental conditions.

Comprehend, apply, evaluate, analyze and synthesize knowledge of kinetics, dynamics, astrophysics, mechanics of fluids, geophysics, physical geology, weather and climate.

Career education/awareness objectives

Students will be able to:

Recognize that scientists and technicians are people, with all varieties of personal characteristics that go along with being human.

Observe men, women, minorities and handicapped persons represented in written materials—to encourage equal access to science-related careers.

Identify sources of information about career

opportunities in science-related fields (e.g., science teaching, engineering, etc.).

Describe why basic education in science, mathematics and technology will enable an individual to move into many fields.

Give examples of career opportunities that have opened and examples of those that have closed as a result of the growth of science and technology.

Recognize that curiosity about natural phenomena is characteristic of persons who are suited to careers in science.

Compare their interests and capabilities with those needed in various science and technology careers, as a result of having perfomed various roles in science-related activities.

The newspaper and secondary science education

Scientific literacy is the central goal of science in elementary and secondary schools. In one form or another, "literacy" suggests that instruction in science should be directed toward the application of science concepts and skills to the personal needs, interests and concerns of students.

We live in a scientific age. Science affects every area of our lives—including our work and recreation, what we eat and how we dress, even how we are born and die. Rapid changes in scientific knowledge make many basic textbooks out of date even before they are printed. The need to focus on the application of science concepts and skills to contemporary society and the "knowledge lag" of most textbooks suggests the need to use in classrooms the most relevant resource available—the newspaper. Indeed, the newspaper is the daily record of "science in our lives."

Just as microcomputers have not yet provided a "quick fix" to all the problems of instruction in schools, neither will newspapers in the classroom. Newspapers should be used selectively to do what they do best—provide timely accounts of public issues, scientific and technological advances and a record of changes in our society.

The following general strategies for incorporating newspapers into instruction have been used successfully by science teachers:

- Obtaining back issues or dated articles in order to make use of newspapers as a data source. Many public and school libraries have back issues of newspapers on microfilm. In addition, many newspapers will provide copies for a particular date if asked in advance. Thus, students who compare back issues with current issues can get a view of employment opportunities or of regional differences on topics such as land use, pollution, scientific advances and so on.

- Developing teacher resource files for different units in science. Students often are given credit for contributing to these files. In a progressive Kansas high school, for example, a biology teacher developed a bin system. Students clip interesting science items from newspapers and place them in a plastic bin, for use by others who are seeking ideas for individual science projects.

- Short presentations by teachers on current science or technology items in the newspaper to convey to students the application of science concepts.

- Writing activities that include introducing six key concepts: who, what, when, where, why and how. In this type activity, students are given a copy of a research paper reported in *Science* or some other professional journal and are asked to write a newspaper article, limited to 300 words, that conveys the essence of the reported study.

- Each student becoming a "class expert" on some science topic studied. In addition to regular library research, students should:

  1. Clip all articles from the newspaper related to their topic.
  2. Clip all pictures, illustrations, graphics or other items found in the newspaper on their topic.
  3. Organize and summarize what they find in the newspaper on their topic.
  4. Write a news or feature story about their topic. Students will need to include with their article any illustrations that might make their story more meaningful or understandable. In addition, they might consider writing an editorial or letter to the editor related to their topic.

In adapting these and other suggested newspaper activities, science teachers should be aware of the level and sequence of expected student learning. In some activities, the objectives may simply be for students to memorize information. Other activities require students to discriminate and identify properties that distinguish one science concept from another, such as differentiating renewable energy sources from non-renewable sources.

Using a concept attainment model for such a unit on energy sources, the teacher could alternately display newspaper pictures of trees, windmills, solar collectors or dams (renewable energy

sources). Interspersed with these pictures would be "non-examples" such as coal mines, oil wells or natural gas meters. Each picture would be labeled "yes" or "no," depending on whether the picture was an example of the concept. The students' task would be to identify the concept the teacher had in mind.

A follow-up strategy would be to distribute newspaper articles on various energy sources and have students, working in groups, develop reports on the supply and demand for these energy resources and the feasibility of either conserving or exploiting the resources in the future. This final activity, with its emphasis on thoughtful problem-solving, represents the type of thinking that science teachers (and others, for that matter) will probably want to emphasize.

Briefly, support for using newspapers in secondary science classrooms can be summarized as follows:

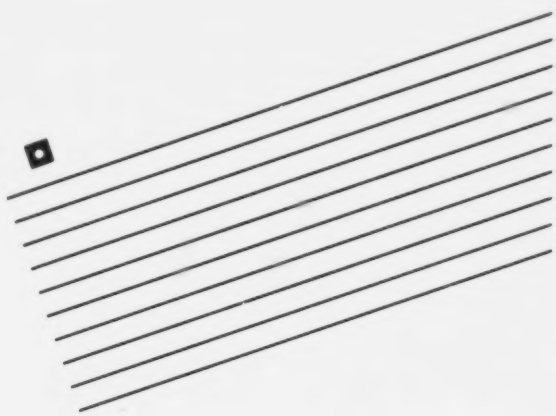
1. First and foremost, newspapers provide "real-life-referents" for teaching science concepts and skills; that is, initial learning, retention and transfer are increased if students perceive a connection between the classroom and everyday life.
2. Stated simply, motivation is thought to be a key to learning; relevancy to one's personal life is thought to play a major part in motivation. Materials that use the newspaper to focus on current and perennial science-related issues will be viewed as real, and thus relevant, to students.
3. The newspaper is an adult medium and will be "the science textbook" for the majority of adults. Its use in the classroom by science teachers will likely reinforce its importance as a source for "scientific literacy."
4. The newspaper is a continuous written record of our lives and times; indeed, it is a basic data source for citizen participation.
5. The newspaper is local and, as such, relates scientific information and events directly to the lives of all students. It is in effect a microcosm of our lives and times.
6. The newspaper overcomes "textbook lag" and bridges the inevitable gap between textbooks and the "real" world.
7. The newspaper encourages students to participate and become involved with the subject matter, engaging them directly in the learning process.

About the activities

Science education is concerned with the subject matter of science and the process skills used to do science. In many of the activities in this publication, both the content and process skills of science are represented. Classifying, inferring, predicting, communicating, interpreting data and problem solving are the process skills emphasized.

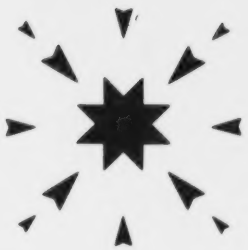
Four goal clusters of science are used as categories to group the various activities. The clusters of personal needs (45 activities), societal issues (51 activities), academic preparation (55 activities), and career education/awareness (17 activities) represent a fresh approach to science teaching—one that is not generally used by current textbooks.

Supplementing science textbooks with the activities included in the publication should be rewarding to both teachers and students, and should help students understand just how science relates to their daily lives.



Personal needs

Student needs—improving their lives and coping with changes in our technological age—are covered in the 45 activities in this section. Newspaper activities that reflect on biological and health issues of individuals are included, as well as more general activities that ask students to respond to ideas from science.



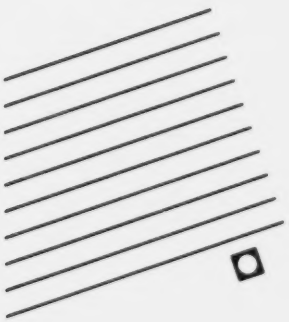
Have students write an editorial designed to inform, influence, entertain, interpret or arouse interest in a science subject.

Have students develop a file of pictures and articles to show women and minorities employed in science and engineering positions.

Have students find a newspaper article on a science problem that interests them. After they have done additional research on the problem and clarified their own views, have them write a letter to the editor indicating their position on the issue. Was the problem finally resolved? What other sides to the issue had they neglected to consider? How did their classmates react to the letter?

Have students collect articles and advertisements from the newspaper that support the view that drugs are a major part of our culture. Have students classify kinds and types of drugs advertised.

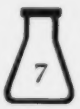
Have students clip articles and advertisements for community service agencies designed to assist with drug addiction and rehabilitation. Have them report their findings in an editorial or feature story.



Have students collect and analyze newspaper articles and advertisements related to the topic of tobacco products and their use. Students should use the information they have collected to design ads against the tobacco products.

Have students locate information in their newspapers about alcohol and alcoholism. They should include in their search advertisements for alcoholic beverages and the appeals that advertisers use. Students could then write a story on the role of alcohol in our society.

Have groups of students find out how newspaper advertisements for tobacco, alcohol and health remedies have changed in the last 50 years. (Students should check the newspaper's offices or the local library for back issues stored on microfilm or preserved as hard copy.)



Have students examine health and beauty aids advertised in the newspaper. Have them identify those items that should be available in every home—for example, soap, first aid remedies, sanitary products. Next they could identify items that are not necessary for most people, but are frequently used. Have students compare prices of the most commonly available medicines.

Have students identify advertisements for products that they use in their homes. Have them analyze the ingredients that make the various products effective (e.g., hair spray, deodorant, toothpaste, foot products).

Have students collect information from the newspaper related to the danger or potential dangers of cosmetic fads and general personal care items. Have students identify and consider consumer protection laws that may apply.

Have students read, clip, and file articles related to current events in the field of mental health. For example, they could describe ways that society attempts to help the mentally ill (state mental hospitals, sheltered workshops, etc.).

Have students read articles and columns from the newspaper that inform the public about new or proposed health and safety laws. Have students summarize the laws and write a brief editorial expressing their own views about them.

Have students identify the various slogans that are used for health products advertised in the newspaper. Have students write their own slogans (serious or humorous) for health products of their choice. Have them use their new slogans to create ads for their products.

Have students read and collect newspaper articles and advertisements related to health or medical insurance. They should determine the costs and need for insurance and any changes taking place in the field of health insurance.

Have students collect newspaper advertisements related to medicine. They should try to distinguish between the facts presented in the advertisements and possible misstatements of fact or half-truths. They should also identify vague or misleading words and unsubstantiated claims.

Have students read the newspaper and report on consumer products that have been recalled because they are considered dangerous or poorly made.

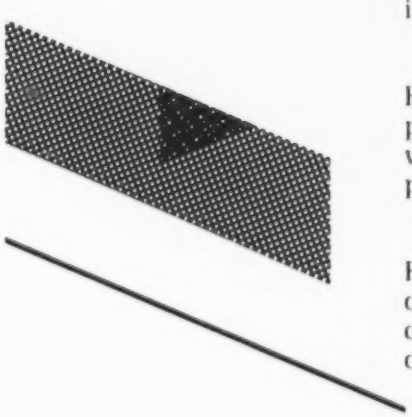
Have students collect articles from the newspaper that report on current medical discoveries (surgical techniques, drugs, preventive care). They might compare medical problems of today with those common in the past.

Have students collect examples of sports injuries reported in the newspaper and report on types, causes and effects of athletic injuries. Student articles should include suggestions on how sports injuries might be reduced by developing new rules, equipment or protective clothing.

For a two-month period, have students collect data on local transportation accidents involving cars, buses, trucks, trains, etc. Have students use pins in a city map to indicate the accident sites. They might try to interpret the data and offer corrective measures for those sites that have a high accident frequency.

Have students collect news articles on accidents that occur outdoors. These might include stories about drownings, problems of exposure (heat or cold), forest fires, poisoning, etc. Have students discuss procedures or safety rules that would have prevented the accidents.

Have students contrast the number of reported accidents and arrests made when the moon is full. Have them gather similar data from the newspaper two weeks later and compare the results. Repeat the investigation several times before discussing possible relationships.



Have students select newspaper articles about water treatment processes. If possible, they should interview an official from the local water department, and then write an article about water treatment procedures in their own community.

Have students find out about a medical problem that interests them by collecting newspaper articles and other sources of information. They could write an article that describes the problem and its manifestations, current research, treatments and possible cures.

Have students read about prominent public figures (either national or local) to find assessments of their mental health. Psychologists' and psychiatrists' speculations about reasons behind people's actions (depression, anxiety, emotional disturbances) are often reported in newspapers, as are accounts of treatments administered. Ask students to think about differences between the resources available to prominent public figures and those accessible to "average" citizens.

Have students use the newspaper to identify terms (transplant, microbe,

vaccine), organizations (American Medical Association, American Cancer Society) and personalities (Jonas Salk, William DeVries), related to disease in our society.

Have students read and analyze medical columns that appear in newspapers and classify types of medical problems discussed. Ask students if they think the columns provide a useful service.

Have students collect articles and ads related to diet and exercise programs. Students might write about the various weight loss and health claims that are made.

Have students compare newspaper ads for cereals with the information actually printed on the cereal boxes. They could write a feature story about the nutritional value of the cereals, or an editorial about truth in advertising. Students might develop charts or graphs comparing nutritional values of different cereals.

Have students clip pictures of food from the newspaper and classify them into the basic food groups.

Have students clip one or more recipes from the newspaper. Using other available sources of nutrition information, students should analyze the ingredients in terms of vitamin, mineral, protein and carbohydrate content. They could write a brief article reporting their analysis, including the nutritional requirements filled or lacking. Students should make note of those ingredients that are thought by medical experts to be unhealthy (that is, high in cholesterol, sodium, fat).

Have students select a food that is unfamiliar to many people in their community or is not used frequently by families they know. Have them design a newspaper display ad to promote increased use of that food. (They should do some research on the food before designing the ad.) They might also write a column or feature story about the food.

Have students analyze newspaper advertisements on the theme "eating out in our community." They should develop a classification system for the restaurants and types of food advertised. Have them write a feature story on their findings. In addition, they could write an editorial about community eating habits from a positive or negative point of view.

Have students examine the newspaper for news articles related to food. Examples might include articles related to food additives, foods thought to be harmful to health or food shortages around the world.

Have students secure copies of newspapers from other geographical areas of the country and compare kinds of foods advertised.

Have students locate advertisements that reflect the health food trend in America. Have them list words used in the ads that indicate nutritional values for the foods advertised.

Have students examine advertisements for various kinds of clothing products. What types of man-made or natural fibers are advertised? If possible, have students compare clothing ads of today with ads from old newspapers.

Have students examine newspaper stories about new uses for plants. Ordinarily we think of plants as sources of food, shelter and chemicals. Students should look for new applications of plants, such as a substitute for natural rubber.

Have students develop landscaping plans for specific purposes, such as attracting birds, providing windbreaks or improving the school's grounds.

Have students collect newspaper articles that identify ecological changes that occur when land is developed for commercial purposes. For example, what impact might a man-made lake have on the area in which it is built? Students should consider positive and negative aspects of changes in the environment. The information they collect could be presented in the form of an editorial.

Have students collect articles that relate ways the environment controls our lives. For example, how do seasons and weather affect us?

Have students select a topic of personal interest related to the environment. Have them use the newspaper to collect all the information they can find on the topic. They might write an article summarizing their findings or particpate in a panel discussion. Suggested topics are acid rain, loss of farmland to urban expansion, endangered species and local land-use issues.

Have students collect newspaper interviews with people of varying life styles. Students might describe how an energy shortage would affect two of the people interviewed. Students might also speculate about which life style was least likely to harm the environment.

Have students write news articles about scientific events they have witnessed (solar eclipse, launching of space shuttle, etc.).

Have students develop a collage on progress in science or current science topics in the news.

Societal issues

Students need an opportunity to deal with society's science-related problems. Newspapers offer an avenue to heighten students' attention and involvement in real-world issues. In general, the activities in this section involve ecological, environmental and energy topics.

Have students identify what they believe are major problems facing society. Have them collect articles that discuss solutions. Then have students propose their own solutions to the problems.

Have students locate newspaper articles related to different climates around the country and world. Have them identify the effect that climate has on the way people live.

Have students collect newspaper photographs of outdoor areas around the world. This will probably need to be an on-going project; during the course of a semester numerous pictures will appear in the newspaper that show the topography of various areas.

Have students use a map to summarize scientific news from around the world. Headlines could be placed on the map.

Have students examine the weather map and related information in the newspaper. Students should use the information to:

- Chart high and low temperatures and other weather information
- Compare weather systems around the world
- Define weather terms used in the newspaper.

Have students clip the weather forecast from the newspaper and compare the forecast with the weather as reported in the next day's newspaper. They could repeat the activity for a few days to determine the accuracy of weather predictions.

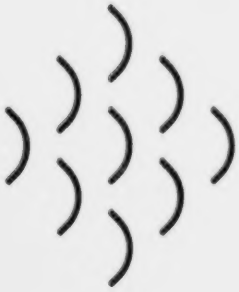
Have students construct a display of articles about soil erosion around the world. Have them describe what they can do to improve the use of soil in their own backyards and in their community.

Have students collect several advertisements for fertilizers that are used to stimulate plant growth. Have them discuss advantages, disadvantages and possible alternatives to fertilizers. They could devise a set of

controlled experiments to determine the relative effectiveness of different fertilizers.

Have students read listings in the newspaper that show production and prices for corn, wheat, soybeans and other commodities. After one week, students might summarize amounts for sale and prices asked. Determine how science has contributed to the production of these products.

Have students form a panel to conduct research on a current crisis headlined in the local newspaper—say, the energy crisis, food shortages or overpopulation. Students should collect information for two weeks and then propose a solution to the problem.



Have students read the newspaper and identify areas of the world where countries are at war. Have them determine to what extent scientific factors (natural resources, climate, overpopulation, etc.) are involved in the conflict, if at all.

Have students look at comic strips for examples of environments that are often stereotyped—desert scenes, farms, urban areas and forests. Discuss other factors of nature that are left out of the pictures.

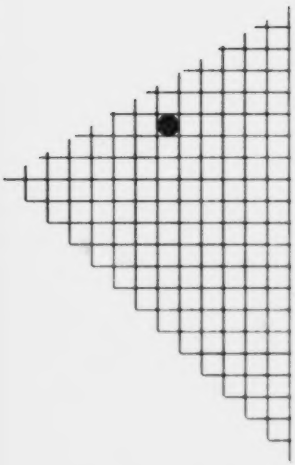
Have students collect articles from the newspaper that relate to oceans. Ask them to develop a method of classifying the articles' contents—for example, food, pollution, research, etc. In addition, students could examine several issues of the newspaper for examples of ways the oceans affect our lives.

Have students read classified and display ads and note which products advertised use a scientific fact as a sales pitch. For example, storm windows reduce energy consumption in the home, vegetable oil is low in cholesterol, etc.

Have students clip cartoons from the newspaper that are related to ecology. They could draw their own cartoons about pollution problems facing our society.

Have students read the newspaper for evidence of population growth and decline. Have them determine the effects of such things as advances in medical technology or population control policies abroad. They could write a short article predicting how unchecked population growth would affect their lives, the lives of their children or the lives of people in underdeveloped nations.

Have students clip news articles, editorials, letters to the editor and other items in the newspaper that reveal the ideas and values that people have about the environment. Ask students to write an editorial that describes their findings and expresses their own views.



Have students, by using evidence from the newspaper, identify positive and negative changes in their community brought about by advances in science. They could write an editorial on their findings.

Have students collect examples from the newspaper of the interdependency of living things.

Have students read and clip newspaper articles and other information related to natural disasters (floods, earthquakes, hurricanes, severe storms, etc.). Students should list the disasters that occur during a two-week period and identify, if possible, the causes of the disasters, damages involved and whether the disaster could have been prevented or the damage minimized.

Have students collect examples from the newspaper of threats to the environment. Have them identify why the threats exist, and write an editorial expressing their opinions about the issue.

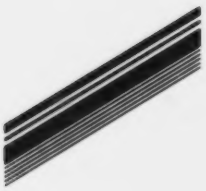
Have students read the newspaper and identify articles that deal with some aspect of water, air or earth pollution. Have them discuss the articles and determine the effects of pollution on life in their community. They might also identify any preventive measures being taken.

Have students read the newspaper to identify agencies or organizations that have as their goal the protection of our environment. Students should identify and analyze the efforts of each agency and the degree to which the organizations appear to be succeeding. They might also contact the agencies to learn more about their work.

Have students divide into groups to conduct research on some topic related to conservation (wildlife, mining, soil and water, fuel, etc.). For their research they should collect articles, pictures and other information from the newspaper, use information at the library and interview persons in the community who are knowledgeable about the topic chosen. Each group should report its findings to the class.

Have students collect articles and advertisements on the feasibility of recycling aluminum cans, scrap iron, platinum, trash and newspapers.

Have students collect newspaper articles that provide information about natural resources and their locations. Have them identify what resources are common to most areas of the world and which are found only in certain areas.

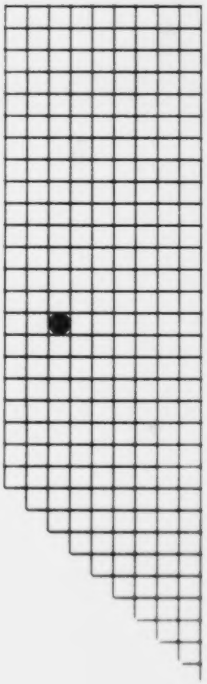


Have students describe natural resources found in their community. They might discuss ways in which these resources affect people in the community. They could make a chart or diorama demonstrating the impact of natural resources on contemporary life, focusing in particular on the impact in their own locale.

Have students collect articles related to the arms race. Have them discuss types of weapons described in the stories and the role of science in the development of both conventional and nuclear weapons.

Have students collect articles about the importance of agriculture in a specific area. They might examine the effect science has had on improved crop and livestock production.

Have students read and collect articles from the newspaper that discuss parks, zoos and game preserves. They could write an article describing plant and animal life protected at the preserves, and the need for such protection.



Have students write a news or feature story on wildlife management. The story should include an analysis of management practices and factors that make wildlife preserves necessary.

Have students examine the newspaper for information related to the potential extinction of different species of animals throughout the world. Have them present their findings in a news or feature story or editorial.

Have students collect pictures of hunters and fishermen displaying their catches. Have a debate on the pros and cons of establishing hunting seasons and on the value of placing restrictions on those seasons, on the size of the animals hunted and the numbers that can be caught.

Have students compile a scrapbook of newspaper information related to conservation regulations and activities in their state. Have them write a summary article about the information they have collected.

Have students contrast items listed for sale in farm or estate auctions in the 1960s with items listed currently. (They will probably need to check back issues of newspapers to find the old listings.) Students should be

asked to speculate about ways farming practices have changed, if at all. In addition, they could contrast the number of farm close-out sales during a particular week in the 1960s with the number of auctions or sales during the same week in the 1980s. Discuss the trend toward fewer farms, if that condition is suggested by the data.

Have students locate newspaper articles or pictures that illustrate a particular ecosystem, such as a rainforest, grassland or lake. Have students investigate how non-living factors of the ecosystem—water, air, soil, light and temperature—influence the population density of the ecosystem.

For a few weeks, have students read the letters to the editor in the newspaper. Have them identify those issues that are related to science. They could write responses to the letters by giving their own opinions about problems raised by the letter writers.

Have students identify a particularly controversial subject related to science. Have them collect articles, pictures, editorials and columns about the issue. What are the opposing views? Who is for or against the issue? How long has the issue been in the news? Why is it controversial? What propaganda techniques are being used or could be used by the opposing sides? When and how might the issue be resolved? Ask students to write letters to the editor stating their own views, supporting those views with facts derived from their newspaper search.

Have students collect articles about various sources of energy (light, petroleum products, water, geothermal energy, radioactive sources, wood, trash, wind and feedlot wastes) and write a report that distinguishes between renewable and non-renewable energy sources.

Have students collect newspaper articles, pictures and advertisements that illustrate the concept of "light." (The newspaper is a fairly good source of information on cameras, telescopes, lasers, solar cells and fiber optics.)

Have students examine newspaper ads and clip examples of the types of machines advertised (agriculture, mining, road construction, etc.).

Have students examine automobile ads in the newspaper. Have them identify different options advertised for new cars and explain how the options are related to contemporary science subjects.

Have students examine newspaper advertisements for automobiles. Have them select any five cars and, by using the advertised estimated

miles-per-gallon, compute gasoline costs to operate each car for one year. They should use local current per-gallon costs and assume that they drive an average of 15,000 miles per year.

Have students examine display and classified newspaper advertisements to identify products that depend on electricity to work. They could develop a classification system for the items, depending on whether they were things used at home, work, leisure, etc.

Have students collect pictures of as many electrical appliances as possible found in the average home and then develop their own classification system for grouping them. Have them discuss the impact of not being able to use any one of the groups of items. Have students collect information on the average costs of using the various appliances and discuss ways to conserve energy.

Have students read the newspaper to collect advertisements for products that are designed to help conserve energy (storm windows, insulation, etc.). Have students analyze the ads and claims made by the advertisers.

Have students collect pictures and illustrations that show items powered by different sources of energy. Students could develop a classification system for their findings.

Have students find information in the newspaper about the construction of nuclear power plants. Have them examine pros and cons of the nuclear power issue, and then write an editorial expressing their own opinion.

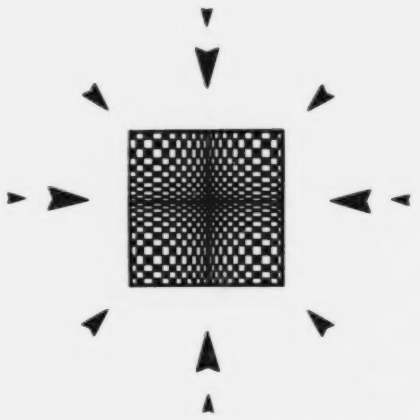
Have students locate, read and summarize newspaper articles about the production, use and conservation of energy.

Have students read the newspaper for specific information related to the supply and demand for energy. Ask students to project where shortages might exist in the next 10 years.

Have students read the newspaper for stories about major technological breakthroughs (mechanical hearts, recovery of satellites in space, etc.). Students should do research to trace scientific developments that led to these advances.

Academic preparation

The newspaper can be used with students to develop concepts and topics in a variety of science areas. The science topics can in turn be used to develop process skills of science. The activities in this section involve various cognitive levels, and begin with knowledge and comprehension activities of science events or concepts. The activities progress into experiences that ask students to apply science concepts and principles to new situations. The application-level activities often provide opportunities for students to demonstrate their understanding through writing exercises. Analysis, synthesis and evaluation activities are included and foster higher-level thinking in students.



Challenge students to search through advertisements to find items that reduce society's work load, i.e. simple machines, pumps, hydraulics, geared mechanisms, motors and engines. Have students locate news articles that report information, discoveries or developments that improve worker efficiency and performance.

Have students cut out advertisements that are designed to appeal to the five senses. As a variation, they could design their own ad for a product of their choice. The ad should appeal to one or more senses.

Have students use an unabridged dictionary to find the etymology of science words found in news articles. Students should describe the words' histories. This is an interesting alternative to memorizing definitions of science terms.

Have students, by using the crossword puzzle in the newspaper as a guide, develop a crossword puzzle of science terms. Have students exchange puzzles with their classmates. (Microcomputer software exists to help with crossword spacing and format.)

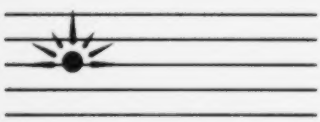
Have students develop a photo file of scientific events. After they have collected, say, 20 or 30 photographs, students could design a photo quiz for their classmates.

Have students prepare a bulletin board for a major science unit or topic. For example, they might display newspaper photos of various versions of the six simple machines: lever, pulley, inclined plane, wedge, screw,

and wheel and axle. Later, have students classify three or four previously unidentified machines.

Have students read the newspaper for information related to achievements of scientists in the news. Have students keep a record of the work of these scientists over a period of time. They could classify the achievements according to different areas of science.

Have students read science articles in the newspaper for a period of one week. Have them develop a science classification system for the articles they have collected. The activity could be assigned to a different student each week so that an expanded classification system could be developed.



Have students identify, define and categorize names and terms related to science in the newspaper. For example, they might find people in the news, events in the news and places in the news—all related to science. This could be a bulletin board activity, with students contributing articles, charts and photographs related to the overall theme.

Have students collect and categorize articles related to a science topic being studied, e.g., transportation, pollution, space, health, etc.

Have students collect and organize newspaper photographs, cartoons and articles concerning health, safety and science. Using this collection, students can prepare bulletin boards and displays.

Have students choose at least three classifications of science (chemistry, physics, biology, astronomy, etc.) and locate a newspaper article related to each classification. Have students write a brief summary of each article.

Have students select at least 15 products advertised in the newspaper. Have them complete a chart that indicates where the items are produced—abroad, in the U.S., in a particular region of the U.S. or right in their own community.

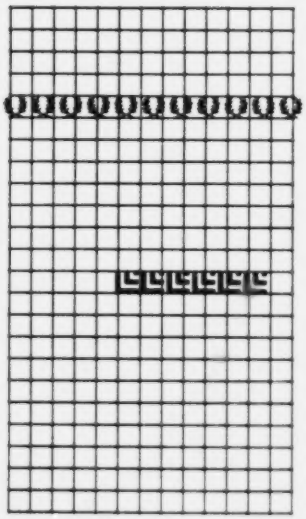
Have students collect articles, photographs and advertisements that identify harmful or potentially dangerous substances. They could devise a system to classify the substances, and write an article or design an ad about the need for safety when using the substances.

Have students locate from newspaper advertisements products that are manufactured locally. Have them identify the raw materials used in the products.

Have students collect articles and advertisements that identify advances in electronics. If possible, have students use past and current issues of the newspaper to complete this assignment.

Have students read the newspaper for a period of one or two weeks. They should identify articles that describe accidents. Have them classify the types of accidents that took place, and, if possible, suggest ways the accidents could have been prevented. In addition to news articles, students can examine obituaries and police and fire department reports.

Have students identify at least one article about practical applications of a principle or process currently being studied in science.



Have students identify at least five inventions or discoveries that have been of great value to civilization. Students should write a brief news article and headline about each invention or discovery, as if it had just happened.

Have students clip news stories about scientific advances in the United States and in other countries. Students can construct a chart to compare the various achievements.

Have students read newspaper articles that predict such events as the sighting of comets, meteor showers, aurora borealis displays, eclipses, earthquakes, etc. They could gather background information on the topic, observe the phenomenon and write an article on their findings.

Have students examine comic strips for examples of characters and events that seem to defy the laws of science. Have them list and discuss their examples. For example, in comics the moon is sometimes depicted in a shape that does not exist in nature.

Have students read a news article related to science. Have them select a favorite comic strip and imagine how the comic characters would discuss events described in the article. Students should rewrite the comic strip to include a discussion of the news story.

Have students prepare a calendar of future television productions on science, including PBS productions of NOVA, National Geographic specials, Odyssey, Omni and others. Display the calendar so others will know about upcoming shows.

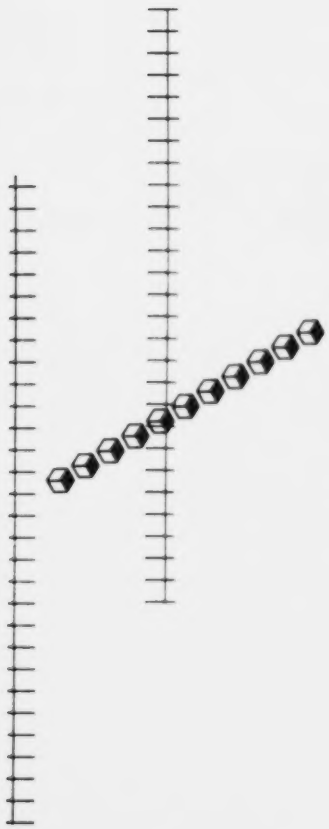
Have students examine the newspaper for items that show how science and technology are continually improving efficiency and safety:

- In the home (new methods of heating and cooling)
- In automobiles (safety belts and air bags, protective bumpers, anti-pollution devices and fuels, etc.)
- In industry
- In air and water travel.

Using a chart of major subjects to be covered in a science course, students could record all items from the newspaper that relate. Thus, they will see science's "real-world" applications.

Have students select a science subject, topic or event that will probably be in the news for a fairly long period of time. They might trace the development of the issue as it has been presented in the newspaper, and write a summary story about it. They should consider using illustrations.

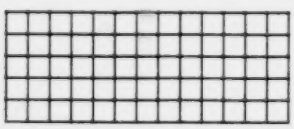
Have students clip major science news events reported in the newspaper for a two-week period. Students should assume that they are editors of a publication that prints summaries of science news. They should develop their own newspaper, using a standard format. In addition to the news page, they should include other newspaper sections, such as editorials, cartoons or feature stories. Students should assume that readers of their new publication have not necessarily read the articles in the daily newspaper.



Have students assume that interplanetary science investigators have landed in their community with special instructions to bring back to their planet one copy of the community newspaper as evidence of "life on earth." Using science as the frame of reference, students should identify at least 10 conclusions that the visitor might have about our society.

Have students assume that they are going to bury a time capsule to be opened 100 years from now. Remind them that the newspaper provides a daily record of our lives and gives an important chronology of events. Their time capsule should include 10 science-related articles or items from the newspaper, and should represent current science issues.

Have students assume that their newspaper carries a column to answer questions about science. They should develop five questions that they would like to have answered. Students might exchange questions; each student should write at least one newspaper column. This works well as an on-going class project.



Have students read newspaper advice columns for examples of questions and responses that are related in some way to science. They could discuss the questions and responses and write their own "science-related" letter to the advice columnist.

Have each student report to the class on one scientific topic found in the newspaper. To avoid duplication, you may wish to assign topics or develop a list of topics for student selection.

Have students collect newspaper headlines of science terms and events. Have them predict future scientific discoveries or progress by developing their own headlines, using words clipped from the newspaper. Students also can show what they know about science subjects currently in the news by writing articles to go with headlines you give them.

Have students prepare brief radio announcements about science subjects reported in the newspaper. They might also use the format of a radio or television talk show to debate or discuss controversial issues in science.

Have students examine newspaper advertisements to identify at least 10 products that were unknown 20 years ago. Have them discuss scientific developments or discoveries that made the new products possible.

Have students select newspaper advertisements for both new and old products. Which products would not have been advertised five years ago? Which would not have been advertised 10 or 20 years ago? Compare ads in old newspapers with recent editions. Does this comparison give any indication of the changing nature of American life? What products might be advertised 10 years from now? In the year 2000?

Have students determine, through an examination of the contents of the newspaper, how technological developments have changed our life styles. Compare, if possible, present life styles with those of 10 or 20 years ago.

Have students clip articles from the newspaper that predict future discoveries and inventions. Students should discuss how the predictions might affect their lives.

During a two-week period, students should select at least 10 newspaper articles related to science. Have them mount the articles on separate sheets of paper. They should evaluate each article and determine the proportion of "good" news to "bad" news reported.

Have students read the newspaper's entertainment sections for articles related to science fiction. Have them discuss what they read. In addition, they could review films and television shows that have a science fiction orientation.

Have students collect horoscopes, articles on astrology, the farmer's almanac, or other pseudo-scientific articles and analyze the contents for clues to their popularity.

Have students read newspapers for accounts of unexplainable events. Have them discuss the events and give their own opinions about what happened. Encourage students to consider scientific explanations.

Have students read news articles that report actions of their local, state or national legislatures. What legislative actions are related to science?

Have students collect articles from the newspaper that tend to refute or call into question earlier scientific thinking or discoveries. For example, how has space exploration changed our knowledge of the universe? What archaeological finds have altered our understanding of the evolution of life?

Have students conduct a scientific investigation or experiment and write a brief news story on their observations.

Have students list major science-related problems facing today's society. Ask students to assume that it is 100 years from now; have them write a brief story about how the various problems were solved.

It is impossible, of course, to know for sure what life will be like in the year 2050. Students should assume that they are reading a local newspaper published then. They might hypothesize about what would be included as news on the front page. They should list at least six headlines that might appear, along with the lead paragraph of each accompanying news story. Also ask students to predict what might be included as science news and what items might be advertised in the newspapers of the future.

Have students study the history of science and choose an era to examine closely. They might create a newspaper about the period. Their newspaper should contain regular features: news stories, editorials, columns, graphics, etc.

Have students write at least five headlines for news stories that they would like to see happen. The stories should relate to scientific achievements that would make life more enjoyable, either by reducing the work loads of citizens and creating more leisure time or by making the world a safer, healthier place to live.

Have students collect editorial cartoons from the newspaper that relate to some topic or issue in science. Students should interpret the cartoons

and give their own opinions about the cartoonists' messages. They could draw their own cartoons to convey an opinion about a scientific topic.

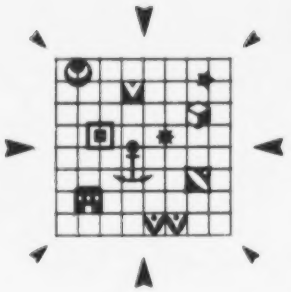
Have students rewrite a favorite comic strip using science fiction as the theme. They might pretend that the comic strip is being printed 100 years from now. Ask them to predict changes that might have taken place in the comic characters or in the story theme.

Have students engage in a "brainstorming" session on creative ways to recycle newspapers. To encourage students to be open to new and unusual ideas, teachers might ask the following mindstretching analogies: How is the newspaper like a lawnmower? What kind of food is like a newspaper? After such a warm-up, teachers should record all student suggestions for possible recycled uses of newspapers. Students can classify these ideas into groups, and discuss which group has the most creative examples.

Have students find a newspaper article that describes a local issue on which citizens hold varying opinions—say, whether to allow construction of parking lots on a flood plain, whether to allow residential tracts to be built on fertile farm land, and so on. Have students record various alternative actions that might be taken. Have them, individually or in small groups, prepare a three-minute presentation that outlines a course of action. Ask a panel made up of other students to evaluate each presentation. Take a class poll to see which group made its case most effectively.

Have students read the newspaper's horoscopes and astrology section. They could conduct research on the history of astrology, or collect articles on individuals who claim to be able to predict the future or look back in time. Alternatively, students might keep track of their own horoscopes for one week, noting whether any of the predictions came true and analyzing the specificity of the predictions.

Career education/awareness

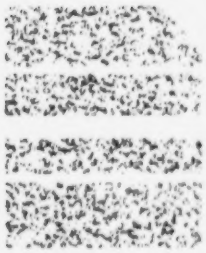


The activities in this section provide students with an awareness of a variety of science-related careers. In addition, newspapers can be used to provide examples of career opportunities that have either increased or declined due to advances in technology.

Have students read the want ads and identify jobs that require scientific training. They could classify the jobs by type of training necessary.

Have students collect articles from back issues of newspapers that detail the backgrounds in science of America's astronauts. Students might attempt to determine whether the astronauts' training, experience and education in science have changed since the earliest flights.

Have students examine help wanted ads to select at least three jobs that require some understanding of science or are related to science. Students should contrast the salaries offered for each position and any other benefits advertised. Ask them to predict the long-range future for these science-related careers. If possible, they might examine newspapers from other areas of the country to compare differences in job advertisements.



By examining the classified sections of the newspaper, students should see confirmation that we are moving from an industrial society to an information-based culture. Ask students to find in the classifieds five examples of jobs that are common to an industrial society and five that are more characteristic of an information society.

Using newspaper articles, note locations and services offered by such agencies as county health departments, the air pollution control board, the lung association, the American Cancer Society, the Environmental Protection Agency, county medical and dental societies, blood bank, Society for the Prevention of Cruelty to Animals, etc. Have students select one of the agencies and report on services provided and science background required for employment.

Have students interview a working journalist to determine how stories concerning local and national issues about science and technology are selected for printing. They could ask the journalist to discuss career possibilities that combine an interest in science with one in journalism. Students might also ask how writers report on local issues without revealing bias.

Have students who are interested in both journalism and science collect information on the training and background necessary for employment as a science writer. (Large metropolitan newspapers or wire service organizations often have such slots.) The student could initially seek information from the director or head of the office of communications, American Association for the Advancement of Science, 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036.

Have students interview a local newspaper editor or staff member to determine how modern technology is used both to gather the news and to compose and publish the news. The students might also ask which special science columns are used by that newspaper. For example, the Smithsonian Institution's public affairs office provides four science articles per month, with pictures, to weekly newspapers throughout the United States.

Have students study the following topics: 1. Which one of the mass media formats is preferred by members of the public who are interested in science news? 2. Based on content analysis, have there been changes in the reporting of controversies in science during the last 30 years? 3. How accurate are newspaper accounts about science research, when contrasted with the primary source?

Have students read the newspaper's TV and movie sections for programs or films of scientific interest. Have them view the program or film and write a scientific review. They could do the same thing for a public lecture or program about science.

Have students write a "how-to" article on some science topic of interest. They should keep in mind the importance of sequence as they write their article. Drawings or charts may be necessary to illustrate the narrative content of the article.

Have students present a science topic to others by writing a special feature article or creating a tabloid supplement. The articles or supplements can be reproduced and exchanged or displayed on a bulletin board. Examples of detailed articles on science can be found in weekly science sections of several large urban newspapers.

Have students choose a feature story related to a science news event that is of particular interest to them. Ask students to summarize the story. They might also explain how a feature story differs from a news story. Have them write their own feature story or stories related to a news event.

Have students collect information from the newspaper related to the field of communication. They could classify the information according

to method of communication (print, broadcast, telecommunications, etc.). Have them examine current and past newspapers (10 years ago) to determine how forms of communication have changed.

Have students prepare photo essays on science topics being studied.

Have students dramatize newspaper accounts of scientific events reported in the newspaper.

Have students construct an activities calendar of science-related events in their area. They should secure the information from the newspaper and post their calendar in the classroom. They could also clip and post information on upcoming science events throughout the state, nation and world (fairs, exhibits, movies, television programs, space exploration ventures, etc.).